

First Activities - Getting acquainted with the lathe

Goals and objectives:

- Set up for spindle turning
- Practice basic tool cuts
 - Roughing out
 - Smoothing
 - Beads & Coves
 - Parting & sizing

Process:

Mount the Blank

- With a short piece of practice stock mark the center on both ends
- Mount on the lathe “between centers,” that is with a spur drive installed into the lathe headstock and a live center mounted in the tailstock
- Secure the work piece by securing the tailstock, advancing its quill until the spur drive on the other end is firmly imbedded.
- Lock the tail stock quill by tightening its small locking lever
- Set a lathe speed of approximately 1800 RPM (see instructor for details)

Turn the blank round (Spindle Roughing Gouge)

- Advance the tool rest to about ¼ inch from the edge or corner of the wood blank
- Set the tool rest so that the cutting edge of the tool is at about centerline of the lathe
- Using the spindle roughing gouge practice making the spindle round, straight and without undulations
- Do the activity with left and right hands working toward both ends of the work piece

Plane the blank smooth (Skew Chisel)

- Using the skew chisel plane the blank so it is as smooth and straight as possible
- Raise the tool rest so that the cutting edge of the tool is about 11:00 o'clock on the face of the wood – keep the tool rest close to the wood
- Work both left and right

Add parting cuts (Parting tool)

- Use the parting tool and calipers to place groves in the practice spindle ½ inch deep and one inch apart
- The parting cuts should be approximately two parting tool blade widths wide.

Turning Beads (Shallow Fluted Gouge)

- Mark the center of each section with a pencil
- Begin turning a bead by resting the shallow fluted gouge on the spindle surface with the flute of the tool facing slightly to the left

- Raise the handle until shaving begin to appear and roll the tool over the left corner shaving it off
- Repeat the action facing the tool the other direction and shaving off the right corner
- With each repeating cut the tool is moves closer to the pencil mark and a greater radius is cut
- As the bead becomes more pronounced the tool is rolled further to the left (or right) so that the cutting edge can stay in contact with the wood surface which is no longer horizontal but becoming more vertical
- As the bead takes shape the handle of the gouge must also be moves laterally in order to allow the cutting edge to stay engaged with the wood surface (now almost vertical)

Turning coves (Shallow Fluted Gouge)

- Coves are cut into the flat surface of the spindle blank from both right and left sides alternatively.
- To start cut the gouge is placed on the surface and rotated so that the leading edge begins the cut; the tool is advanced in the direction of the flute
- The handle is unrolled so that the flute end up facing vertical and the cut ends.
- This action is repeated from the opposite direct creating a small scoop shape
- Each successive cut from the right and left sides begins a small distance further away from the scoop out area
- As the cut deepens the gouge is pushed further forward to allow the cutting edge to stay engaged with the wood surface.

Project One

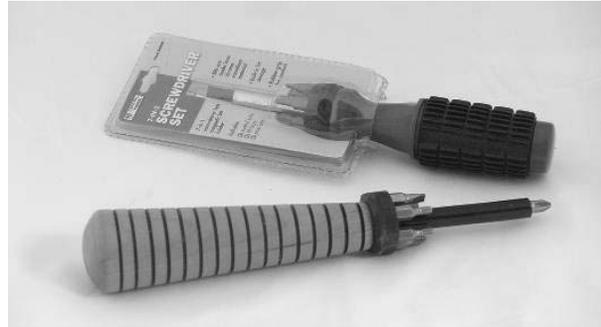
Screw Driver Handle

Goals and Objectives:

- To use the basic tools introduced to complete a simple project
- To learn how to use the four-jaw scroll chuck to hold work
- To learn the basics of surface smoothing and sanding

Turning Tools:

- Spindle Roughing gouge
- Shallow fluted gouge
- (skew chisel)
- Four jaw scroll chuck
- Jacobs chuck and drills



Process:

- Purchase an inexpensive screw driver at a local hardware store and remove the metal sleeve
- Use a coping saw to cut off the plastic and remove the parts
- The best screw driver have a round metal shaft with two small “ears” on the shaft which must be ground away
- Mount the wood between centers and turn round
- Add an appropriate tenon to the tailstock end of the project to fit your chuck
- Remove the roughed out spindle and screw on your four jaw chuck
- Be sure the chuck is secure against the headstock
- Examine the removed shaft and grind away any tabs on the imbedded portion
- Measure the diameter of the shaft and drill an appropriate hole
- Test fit the driver shaft for a snug fit
- (The shaft will be glue in with medium CA glue at the end of the project)
- Turn a pleasing shape that fits your hand
- Stop and test the fit to your hand
- Sand
- Use 80, 120, 180, & 220 grit sandpaper
- Lower the lathe speed to approximately 800 RPM to not overheat the wood while sanding
- With each grit, sand with the lathe running and the sandpaper constantly moving
- With each grit sand with the lathe off and horizontally with the wood grain until all visible circular marks are gone
- Advance to the next grit and do the same sanding process always ending with the grain
- Apply a finish of choice

- Be sure not to get the handle too slick as it will be harder to grasp
- Part off and assemble the driver
- Using the skew chisel make a series of “V” cuts at the headstock end near the chuck
- As the cuts deepen the rotating handle will become unstable and needs to be held lightly while completing the cuts.
- Alternatively, reduce the diameter at the end of the handle to about ¼ inch, stop the lathe and cut the remainder through.
- Sand and complete the end of the driver

Project 2

Turning a Bottle Stopper

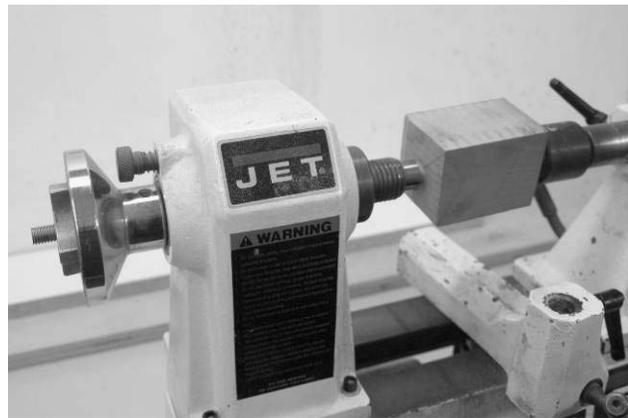
Objective:

- To further practice bead turning, sanding and finishing techniques
- To reduce the scale of the turning requiring more delicate actions by the student



Process:

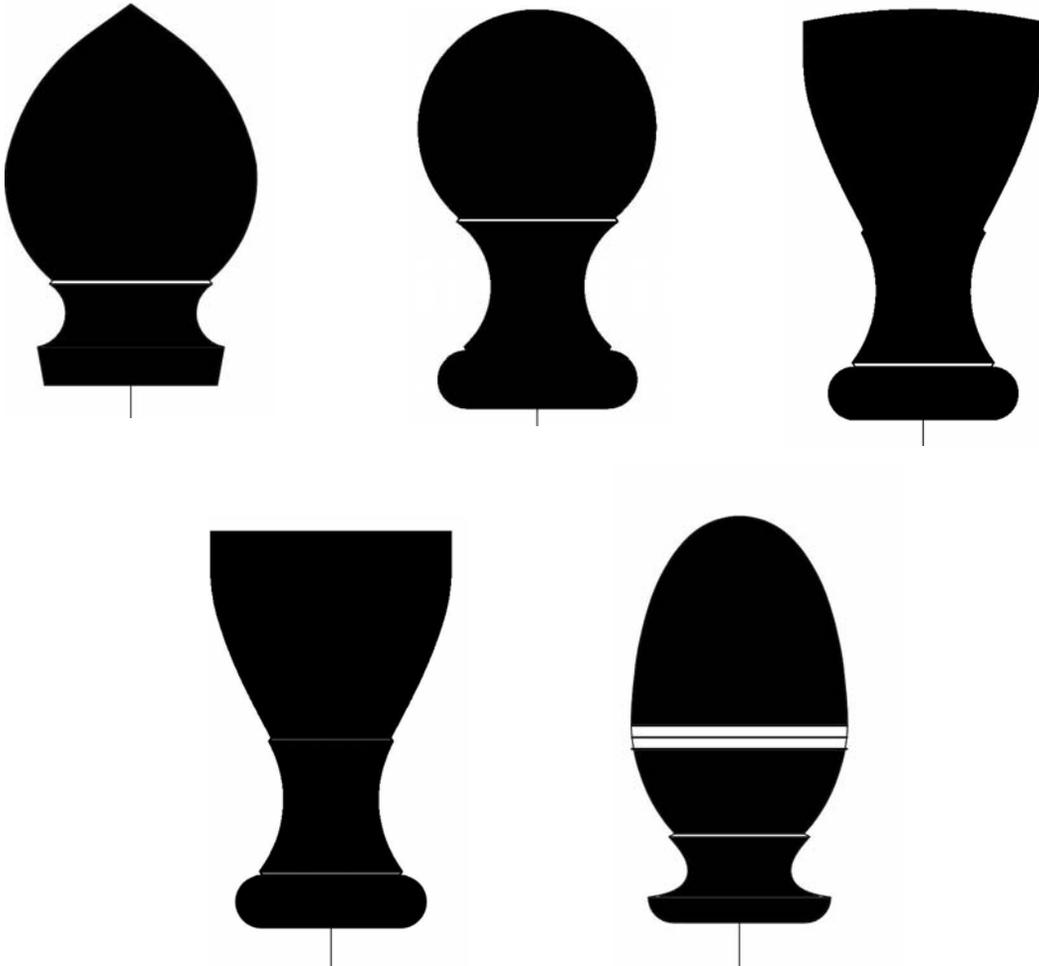
- Drill a 3/8 hole in the stopper blank
- Glue into the hole a 2 inch long x 3/8 inch dowel with wood glue, allow to dry
- Place a 3/8 collet chuck into the lathe's headstock
- Attach a 3/8 NC drawbar with locking knob to the outside of the headstock's hand wheel
- Insert stopper blank/dowel into the collet and tighten the draw bar until the dowel is secure
- Advance the tailstock for additional support



- Turn the desired shape (see examples following)
- Remove the tailstock and complete the end
- Sand and finish
- Remove from lathe by loosening the draw bar and tapping the draw bar to free the collet from the lathe headstock thus loosening the stopper's dowel
- Add a drilled cork stopper and glue into place with yellow glue
- Trim the dowel flush with the end of the stopper and sand flat

Here are some shape considerations

- The base of the stopper should be larger than the diameter of the cork
- The top of the stopper should have a “handle” to grab for easy removal
- Keep the shape simple



Project 3

Turning a 7 mm Pen

Objective:

- To learn the techniques for building kit pens
- To further practice careful, detailed turning techniques
- To learn to sand to the finest level of detail

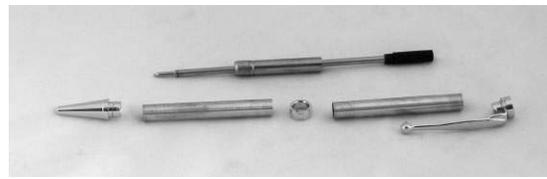


Discussion:

Pen turning requires three separate groups of activities: preparing the blank for turning, turning the pen, and assembling the kit.

There are a number of supply items required:

- Pen blank $\frac{3}{4} \times \frac{3}{4} \times 5$ inches, straight grain hardwood
- 7 mm American Slim pen kit & instruction sheet
- 7 mm brad or bullet point drill bit and drill
- 7 mm pen mill
- Pen mandrel and bushing for 7 mm American Slim pen kit
- Medium thickness Cyanoacrylate glue (& accelerator)
- Fixture for hold blank vertical while drilling
- Pen to mark blank alignment
- Sanding supplies
 - 80-100 grit for roughing brass tubes, 120-600 for sanding finished pen
- Finish
 - Friction polish
 - Cloth to apply polish
- Turning tools
 - Spindle Roughing Gouge
 - (3/8 shallow fluted gouge)
 - (Skew chisel)



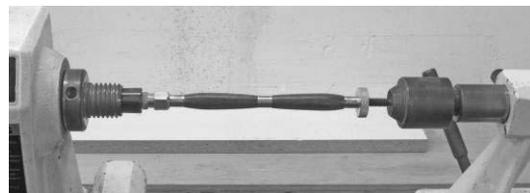
Part one: Preparing the blank for turning

- Cut blanks to length
 - Measure brass tubes and mark on wood blank
 - Add 1/8 inch to each length
 - Cross cut blanks squarely
 - Mark mating ends for realignment later
- Insert brass tubes into blanks
 - Rough the surface of each tube with 80-100 grit sand paper

- Coat each tubes with medium thickness Cyanoacrylate glue
- Twist the tubes into the wood blanks from the mating (marked) ends
 - Press the tubes slightly below the wood surface
- Allow to dry or add accelerator
- Square blank ends for turning
 - Using a 7 mm pen mill square each end of each blank
 - Assure the blanks are firmly clamped
 - Assure that the brass is exposed and shiny at each end when completed
 - (Do not over cut the ends as the pen length will be affected)

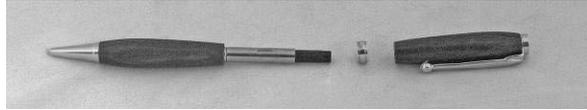
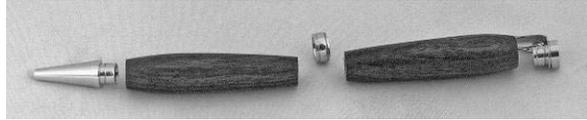
Part two: Turning the pen

- Assemble the blank on the mandrel
 - Place one 7 mm bushing on the mandrel followed by one blank
 - The reference mark should be facing the tail stock
 - Insert a second 7 mm bushing and add the second blank
 - The reference mark to face the head stock (and the other reference mark)
 - Add the third 7 mm bushing and secure in place with the brass end screw.
 - Tighten completely
- Insert mandrel into lathe headstock
 - Clean the lathe's taper and the matching Morris taper on the mandrel
 - Insert into the lathe and bring up the tail stock
 - Tighten the tailstock only enough to engage the live center point into the dimple on the mandrel's end
 - *Over tightening will damage the mandrel and cause the pen to be turned oval*
 - Set lathe speed to 1800 RPM
- Rough turn using the spindle roughing gouge
- Finish turn the pen
 - Reduce dimensions until approaching the diameter of the bushings
 - Leave a small amount of wood proud of the bushing to allow for sanding
 - Sand skipping no grits
 - Keep sand paper moving at all time to minimize circular scratches
 - After each grit, turn lath off and re-sand with the grain
 - Complete sanding with 0000 steel wool
- Apply appropriate finish
 - Friction polishes
 - Use small square of shop cloth or cotton
 - Apply a thin coat allow to dry
 - Increase lathe speeds and burnish until finger get warm
 - Reapply if desired



Part three: Assemble the Pen

- Remove the two blanks from the lathe keeping them in exact order
- Assemble the writing tip
 - Insert the pen tip into the far left blank end
 - Press into place squarely with pen press or wood-faced vice
 - Insert the twist mechanism into the other end of the same blank
 - Brass end first
 - Press into the blank until the marking band is slightly proud of the blank
 - Test the position by insert the pen refill and twisting to full extension
 - Adjust the fit by repressing the mechanism
 - *(Do not over press as removal is very difficult)*
- Assemble the top section
 - Insert the clip into the cap and press into the far right blank end
- Complete pen assembly
 - Place decorative center bank over the twist mechanism
 - Press the top portion of the pen into place



Project 4

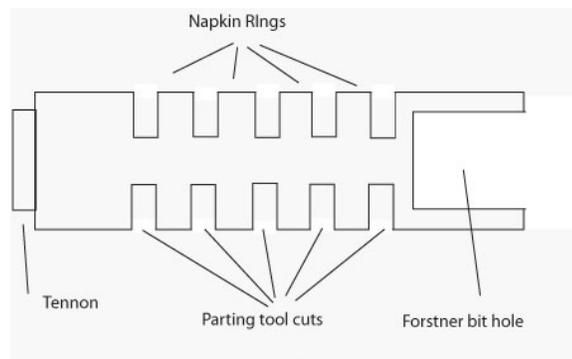
Turning a napkin ring set

Objectives:

- To practice using the calipers to set dimensions
- To layout and plan a project
- To learn methods for remounting and completing a project
- To continue to practice in making beads

Discussion:

The dimensions for this project can be varied without difficulty if the concept and the proportions are maintained. Generally an OD of 3 inches and an ID of 1 ½ inches are acceptable. The following drawing represents the concept of this project.



1. Select stock approximately 3 inches in diameter
 - a. Mount between centers
 - b. Set the lathe speed to approximately 1800 RPM
 - c. With a spindle roughing gouge, make round



2. Mount in a four jaw chuck
 - a. Measure the partially closed jaws of your chuck
 - b. Transfer this dimension to the end of the stock
 - c. Reverse and mount in the chuck, bring up the tailstock for support
 - d. Re-true as required



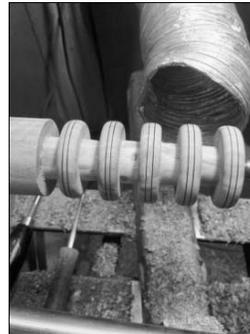
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3. Mark out the napkin rings and separation areas
 - a. The napkin rings should be approximately $\frac{3}{4}$ inch in diameter
 - b. The parting cuts between rings should be $\frac{3}{4}$ to allow for sanding the edges later
 - c. Layout the first ring, then a parting cut, and then the second rings, etc.



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4. Reduce the diameter between the napkin rings
 - a. Use your parting tool and calipers to reduce the diameter to 1 inch



5. Shape the napkin rings
 - a. Roll the edges with a shallow-fluted gouge
 - b. Sand and decorate as desired – be sure to sand the sides also



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6. Separating the rings
 - a. Select a 1 ¼ inch Forstner bit
 - b. Replace the live tailstock center with a Jacobs chuck with the Forstner bit installed
 - c. Lower the lathe speed to 500 RPM
 - d. Advance the tailstock quill to drill through the first napkin ring.



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7. Remove the rings
 - a. When the first ring is free, stop the lathe and remove it
 - b. Advance the tailstock and repeat the drilling steps



8. Finish the napkin rings

- a. Hand sand the rings through 220 grit to remove any interior rough spots
- b. Add a finish to suit



Project 5

Bud Vase

Goals & Objectives

- Practice transferring dimensions
- To learn to “blend” a bead into a cove
- To practice smooth cuts
- To learn to flare the inside neck by cutting end grain

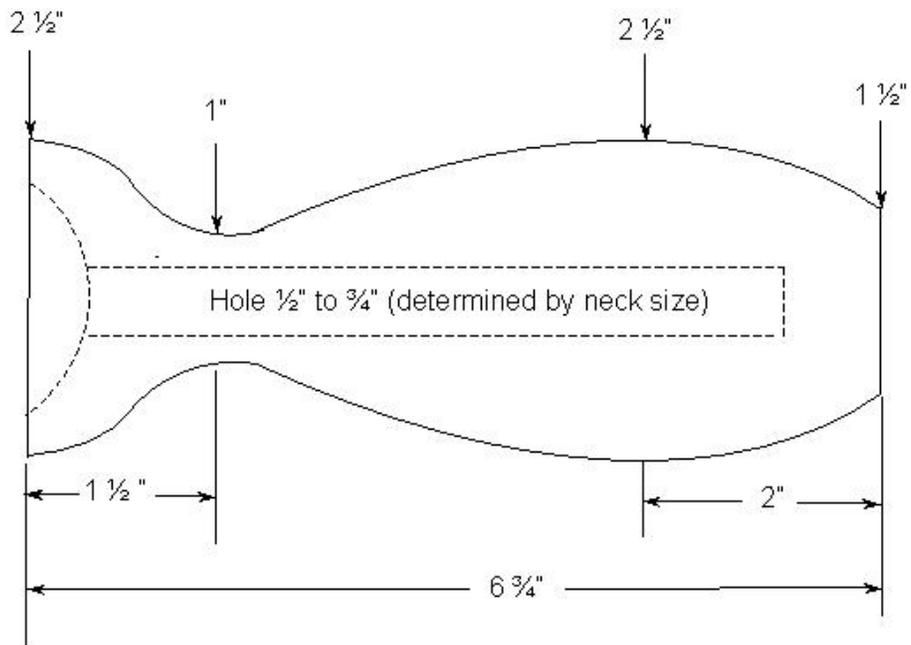
Materials & Supplies

- Wood blank 3x3x8
- Four-jaw chuck
- Spindle Roughing Gouge (SRG)
- Shallow fluted gouge
- Drill bits and Jacobs chuck
- Parting tool & calipers
- Sand paper & finish

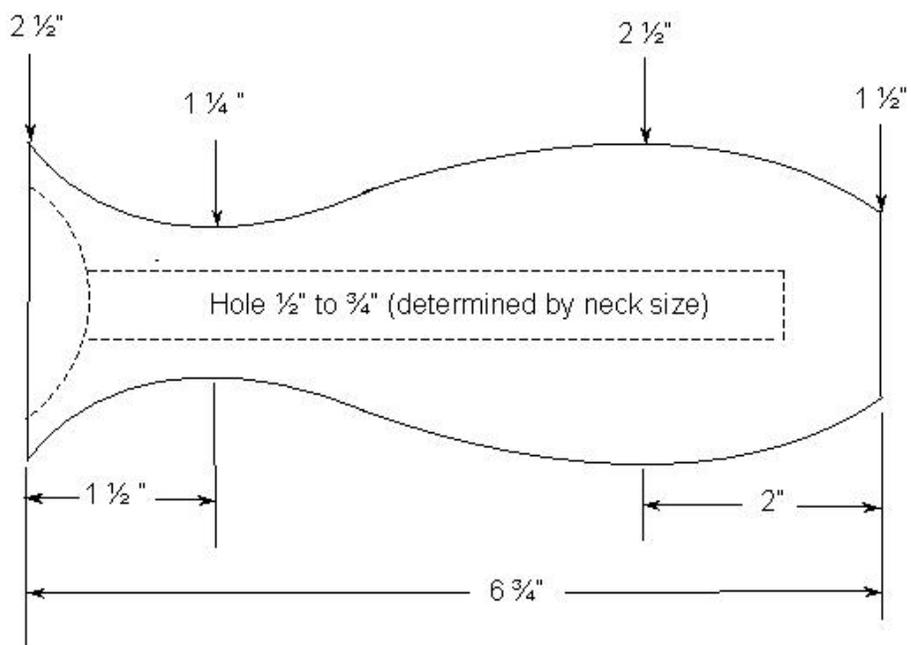
Process

- Mount a wood blank between centers
- Rough turn wood blank round and add a tenon for your matching four-jaw chuck
- Transfer the blank to the chuck
- Bring up the tail stock for support
- Re-true the blank
- With the parting tool and calipers, transfer major dimensions to the blank from drawing
 - Vessel length
 - Major diameter
 - Minor diameter
- Transfer the top diameter to the end of the wood billet
- Turn only the top 2/3 of the shape beginning at tailstock end of the lathe
- Drill depth hole from tailstock end with the Jacobs chuck and drill
- Flare out the inside of the vessel neck (see instructor for procedure)
- Complete shape by reducing base diameter to final dimension
- Add a small parting cut at the bottom of the base
- Sand and finish
- Part off

Bud Vase 1



Bud Vase 2



Advanced Project

Building a Candle Stick

Objective:

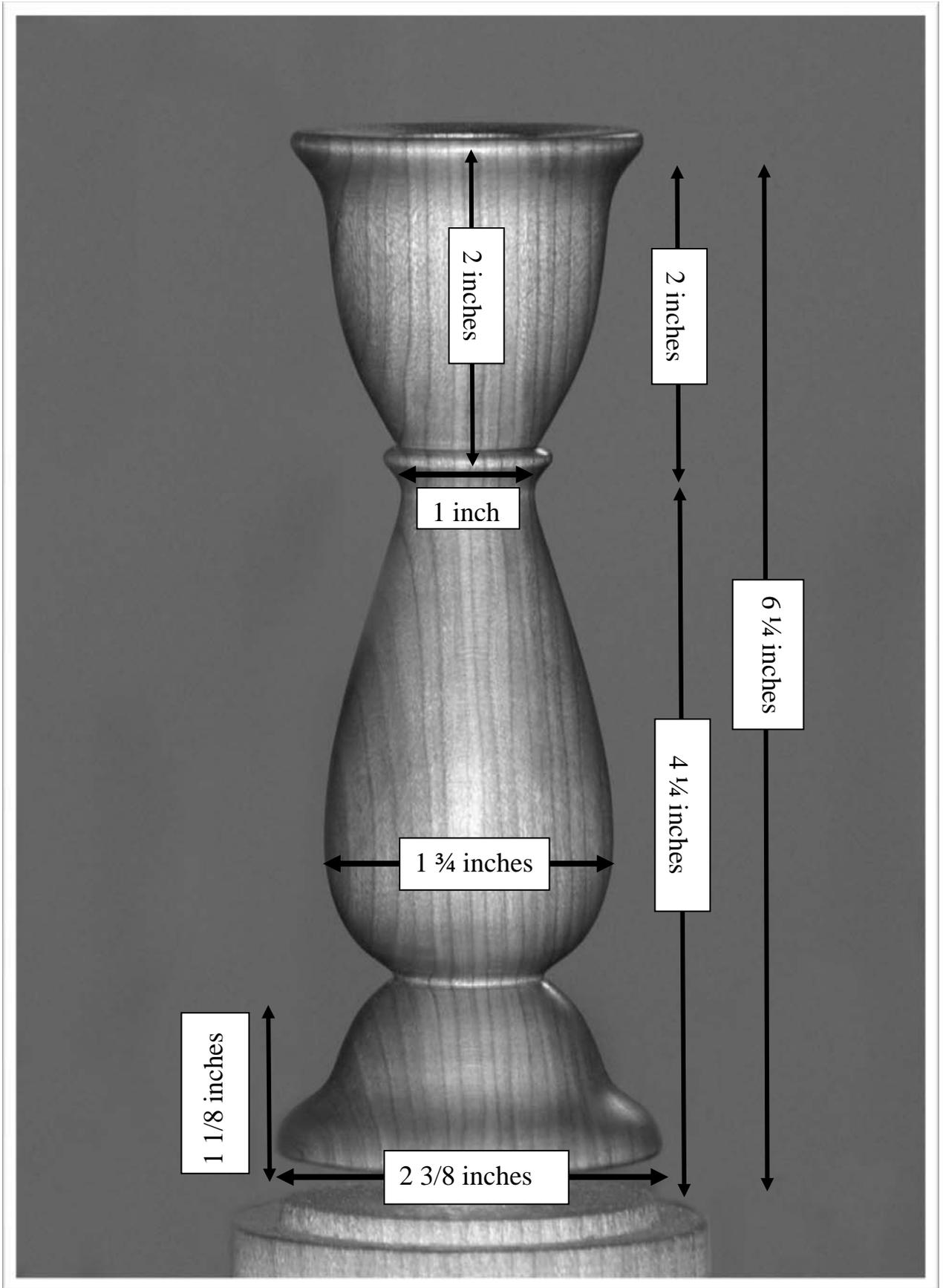
- To accurately transfer measurements to the project
- To practice fine cuts with the shallow fluted gouge
- To practice longer, continuous shaping cuts

Process:

1. Cut stock to 2.5 x 2.5 x 8 inches
2. Rough turn blank between centers
3. Mark tennon for four jaw chuck
4. Remount into a four jaw chuck and re-true as required
5. Mark out major transitions onto stock with pencil
6. Using parting tool and caliper, transfer appropriate dimensions
7. Turn to design
8. Drill for candle using a Jacobs chuck and a provided candle taper bit
9. Complete candle stick by reducing diameter of stock below the base area
10. Reshape the base area as required
11. Sand and finish
12. Part off project using a small parting tool part off the project with an angle cut about 10 degrees toward the tailstock

Turning guidelines:

- Always work from tailstock end of lathe towards headstock
- Make stock round with the spindle roughing gouge
- Complete additional turning using the shallow fluted gouge



Resource List

Wood Turning major specialty suppliers

Craft Supplies, USA
1287 East 1120 South
Provo, UT 94606
1-800-551-8876
www.woodturnerscatalog.com

Packard Woodworks
PO Box 718
Tryon, NC 28782
1-800-683-8876
www.Packardwoodworks.com

The Cutting Edge
7123 SouthWest Freeway
Houston, TX 77074
7-800-790-7980
www.cuttingedgetools.com

Inexpensive turning tools and pen kits

Penn State Industries
9900 Global Road
Philadelphia, PA 19115
1-800-377-7297
www.pennstateind.com

WoodTurningz, Inc
17408 Tiller Court
300
Westfield, IN 46074
1-888-736-5487
www.woodturningz.com

Arizona Silhouettes
660 East 18th Place
Suite B
Yuma, AZ 85365
1-928-329-9466
www.arizonasilhouette.com

General woodworking dealers (local)

Rockler Woodworking
541 Contra Costa Blvd
Pleasant Hill, CA 94523
1-925-521-1800
(10% discount on supplies if you mention you are MDAE student)

Woodcraft of Dublin
6044 Dougherty Road
Dublin, CA
925-875-9988
(15% discount with student discount card)

Inexpensive grinding wheels, drills, etc

Enco
400 Nevada Pacific Highway
Fernley, NV 89408
1-800-873-3626
www.use-enco.com

llets for bottle stoppers P/N 1749
The Little Machine Shop
396 W. Washington Blvd. ,l #500
Pasadena, CA 91103
1-800-981-9663
www.thelittlemachineshop.com

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